





ON  
A N C H Y L O S I S.

BY

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BELLEVUE HOSPITAL MEDICAL COLLEGE, NEW YORK.

[*FROM THE TRANSACTIONS OF THE NEW YORK ACADEMY OF  
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## ON ANCHYLOYSIS.

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Read October 15, 1874.

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MR. PRESIDENT AND GENTLEMEN OF THE NEW YORK ACADEMY OF MEDICINE:

I SHALL occupy you a short time this evening in considering the subject of ankylosis, and its treatment.

Ankylosis, from the Greek word *ἀγκύλος* (*crooked* or *hooked*, because most joints when stiffened are deformed in this manner.) Although the true pathology is stiffness, immobility or consolidation, no matter whether in a straight or crooked position, yet the term ankylosis, or crookedness, has been so long used by the profession to designate the pathological condition of which we are now speaking, that I shall continue to employ it.

Ankylosis is either true, osseous, or complete; or else false, fibrous, or incomplete. True or complete ankylosis signifies the fixed and absolutely motionless state of a joint. False, fibrous, or incomplete ankylosis denotes a limited motion in the joint, no matter how slight that motion may be.

Ankylosis is more common in the ginglymoid articulations than in others, but may occur in every description of joint. In general, only one joint is ankylosed in the same individual; but I have seen one case, in a gentleman under thirty years old, from Providence, R. I., in which both hips, one knee, and both ankles were apparently completely ankylosed, as the result of rheumatic inflammation. I have seen one other case, in a young lad of fifteen, from Kentucky, who had disease of his right hip-joint, and, for the purpose of procuring rest of

that joint, was put by his attending surgeon into a fixed apparatus, embracing the trunk, pelvis, and both lower extremities, and so retained for several months. At the end of this time, the diseased hip was cured by ankylosis, and the knee and ankle of the diseased limb, as well as the hip, knee, and ankle of the opposite one, were completely ankylosed, and still remain in the same condition.

In this case there had been no inflammatory action in any of the joints, except the right hip, and he had never complained of or suffered pain in any of them. This case is of great importance, showing as it does that ankylosis can take place even in a young person, in a perfectly healthy joint, by long-continued rest.

In old age, ankylosis, in certain parts of the skeleton, is a natural change ; and in this period of life it is common to find the heads of the ribs ankylosed to the bodies of the vertebrae, or the tubercles to the transverse processes, the vertebrae to one another, the ensiform cartilage to the sternum, etc.

Ankylosis is not a disease of itself, but may be the result of any disease, affection, or injury, which interferes with the normal functions and motions of a joint.

Ankylosis may be the most favorable termination that can occur in many diseases and accidents of the joints. In such cases it is of the most vital importance that the surgeon should select the most favorable position for the future usefulness of the limb thus involved. As, for instance, the elbow is more useful when ankylosed at a right angle than if made straight, whereas the knee would be entirely useless if ankylosed in the same manner ; its future usefulness and security being better obtained, by having it ankylosed perfectly straight, or as nearly so as may be. It is owing to the neglect of observing this principle of placing a limb in its most favorable position for future usefulness, while consolidation is taking place, that subsequent surgical interference is necessary.

In chronic or long-continued inflammation of any joint, reflex irritation, producing muscular contractions, invariably takes place.

This contraction not only aggravates the disease by causing undue pressure on the parts inflamed, but also distorts the limb in accordance with the action of the most powerful muscles involved, and the distortion can only be prevented by the proper application of an extending and counter-extending force during the treatment of the disease. When this principle has been neglected, the patients frequently recover with such seriously distorted and useless limbs as to render surgical interference necessary.

In such cases it is of the utmost importance to ascertain whether the ankylosis be complete or incomplete, as the plan of treatment in each particular case depends entirely upon the accuracy of this diagnosis. If fibrous, or incomplete, it can be broken up by manual or mechanical force, aided by subcutaneous tenotomy, myotomy, and the section of such fasciæ, fibrous bands and other adhesions, as have prevented its mobility; whereas, if the ankylosis be true, or bony, the deformity can only be relieved by section of the bone itself with the saw or other instrument. In many cases of simply fibrous or incomplete ankylosis, the adhesions are so firm and so short as to allow of no perceptible motion, even under a very careful inspection. In such cases, if there has been any motion whatever, although so slight as not to be observed at the time, yet on the following day the parts which have been subjected to the violence necessary for the examination will give evidence, by pain, tenderness, and inflammation, that some motion must have been given to the parts involved. In one case of ankylosis of both hips, with very great distortion, by complete flexion and adduction, in a young girl of nineteen, from long-continued suppuration of both hip-joints, the ankylosis was so complete that, in consultation with all the surgeons at Bellevue Hospital, we all decided that it was a case of osseous fusion, and could only be relieved by section of the bone.

On the following day, when I went to perform the operation, there was so much tenderness about the parts, that I was satisfied some motion had been given to the articulation, although so slight that none of us had been able to detect it at

the time of the examination. I therefore determined to break up the adhesions, instead of sawing out a portion of the bone. The adductors tensor-vagina femoris, and fascia lata, of both sides were subcutaneously divided, the wounds carefully closed and covered by long strips of adhesive plaster and compresses. A figure-of-8 roller was then carefully applied around each hip, after which the adhesions were forcibly but very freely broken up, and the limbs brought as nearly as possible to their natural position, and retained there, by extension and abduction by weights and pulleys, which were secured to the limbs, in the usual way, by adhesive plaster and roller. The patient was kept perfectly quiet, the parts kept cool with ice-bags, and at the proper time passive motion was made. The result in this case was perfectly satisfactory, the patient recovering, with good motion of both joints. She has married since, and was delivered by the late Dr. George T. Elliot, of a living child, who is now a robust boy, of five years of age. Previous to the operation, this woman could only walk upon her hands and feet, the limbs being closely flexed and adducted, and the ankylosis so complete, as before stated, that all who examined her thought it to be osseous. She is now in perfect health, and performs all her household duties without the aid of a servant.

Having made our diagnosis that the ankylosis is fibrous, and not osseous, how shall it be broken up? In former times gradual extension, with steaming and friction, was considered all that was necessary, but the length of time demanded and the great pain induced by this method of treatment, frequently prevented the patient and surgeon from carrying it to the completion of securing perfect motion. The slow and gradual stretching of tissues, long contracted, produces reflex contractions in many instances to such a degree as to compel the treatment to be abandoned, and patients prefer to remain with their limbs in the distorted condition rather than undergo the constant pain of continued extension.

In all such cases it is infinitely better to proceed to the immediate restoration of the joint to its normal position, with

entire freedom and mobility by manual force under the influence of an anaesthetic combined with tenotomy or myotomy or subeutaneous section of the fascia, if necessary, than to resort to the slow process of gradual extension.

How are we to decide whether tenotomy, myotomy, or the section of fascia, is requisite? By putting the parts upon extreme tension, and while thus stretched, if point pressure by the finger or thumb be made on the fascia or tendon thus stretched produces reflex contractions, then that fascia, tendon, or tissue, must be subeutaneously divided or else forcibly ruptured before the limb can be restored to its normal position. If the tissues thus contracted can be reached with the knife without the danger of involving large blood-vessels or nerves, section by the knife is better than forcible rupture. If it is necessary to make this subeutaneous section, it is better to do it three or four days previous to the breaking up of the joint, so that the external wound made by the tenotome may have adhered before the latter operation is performed. This tenotomy may be performed under the influence of an anaesthetic, or not, as the surgeon chooses; but when the *brisement* proper is performed an anaesthesia is absolutely essential. In fact, it is due to anaesthesia that *brisement forcé* has gained its reputation, and to it chiefly owes its success.

The patient being thoroughly anaesthetized, the limb is seized by the hands of assistants, holding it with firmness, between the joint involved and the trunk, while the surgeon takes the farther extremity of the limb and forcibly flexes it upon itself, which is frequently attended with sharp snaps and cracks that are sometimes quite audible and that are very distinctly *felt* by the surgeon's hand while making the rupture. Having flexed it sufficiently to begin to allow of moderate movements, he then reverses the movement and forcibly extends it; and in this way, by forcible flexion and extension, continues until he has gained perfect and free motion of the joint involved in all its normal movements. If the knee is the joint involved, care must first be taken to fracture off the patella from its attachment to the femur, which is some-

times the most difficult part of the operation to be performed. In many instances a surgeon can aid himself by covering the handle of a key with buckskin, and by its use give himself a firmer leverage against the edge of the patella than he can get with his naked thumb. Having thus obtained a perfect extension, and perfect flexion, in fact, the complete movements of whatever joint involved, these movements are repeated with great freedom and with great frequeney until all the adhering surfæees are thoroughly and completely broken up.

One of the commonest causes of failure in the treatment of *fibrous ankylosis* by *brisement forcé* is, that the surgeon, succeeding in getting a moderate motion, and becoming alarmed at the audible fraetures that occur, contents himself with that slight motion for the present operation, intending to complete the cure by subsequent operations, and thus, by making frequent attempts to increase these slight movements, sets up a new inflammation in the parts involved, preventing any further interference, and frequently resulting in a more firm consolidation of the joint than before ; whereas, by breaking up the adhesions thoroughly and completely at the time of operation, and then, by proper dressings of the parts and the prevention of inflammation, he may confidently expeet that he will have a much more satisfactory result.

How are these dressings to be applied ? and how is this inflammation to be prevented ? This I look upon as the most important part in the treatment of an ankylosed joint. For many years past I have always adopted the following plan : If, for instance, it be the knee which I have broken up for *angular fibrous ankylosis*, I first strap the toes with strips of adhesive plaster if it be a small subject, or if an adult with long toes, pad the toes with eotton and bind with bandage, earrying the roller over the foot strongly and firmly, padding the malleoli and tendo-achillis with cotton, the roller is carried snugly over them ; two strips of adhesive plaster having been placed on either side of the leg for extension, the roller is passed over them, leaving their lower extremities exposed for the future attachment of weight and pulley, and is

carried up as far as the top of the tibia. The popliteal space is then padded and firmly strapped with strips of adhesive plaster, each one shingling over the other until the entire knee is covered. The roller is then continued over the knee smoothly and very firmly until you come to the junction of the middle and lower third of the femur, where a piece of sponge an inch or two in length, and about the size of your thumb, is placed over the track of the femoral artery, and the roller carried on over this sponge for the purpose of making partial compression of this artery, so as to diminish its calibre and thus prevent the full supply of blood to the parts below. Great caution is necessary in the application of this pressure upon the artery not to obstruct the circulation so as to produce gangrene; we must here *use* pressure without *abusing* it. The limb is then secured in an absolutely immovable position either by a wooden splint well padded placed behind the leg, gutta-percha, sole-leather, plaster of Paris, iron bars on either side of it, or in any way that the surgeon may deem best for the purpose of preventing the slightest possible movement. The patient is then placed in bed, the lower extremity of which is raised ten or twelve inches higher than the head of the bed, so that the body may act as a counter-extending force, and the weight and pulley applied over the foot of the bed to the strips of adhesive plaster at the ankle-joint before described. Ice-bags are then placed around the knee, and such constitutional treatment in the way of narcotics, cathartics, etc., as may be required are judiciously used. At the end of six or seven days the dressings are removed, the sponge taken from over the femoral artery, the adhesive straps cut from over the knee, and the parts carefully examined, and a very slight movement given to the joint for the purpose of preventing solidification, when the dressings are reapplied with the sponge left off from over the femoral artery. At this dressing the surgeon will often be surprised to find ecchymosis to some extent, both above and below the joint, from extravasated blood caused by the rupture of vessels at the time of the operation; but, by following the plan that I have here laid down, I have

never seen a ease that went on to suppuration sinee I have adopted this method of treatment, now numbering nearly one hundred cases. The extension is still continued and the elevated position of the limb is still preserved for some days, until all danger of inflammation is passed, the surgeon exercising his judgment whether the application of ice is still to be kept up or not. At the end of a few days the dressings are again removed, and more free motion is given to the part. It may be neecessary at the time of making this movement, and the three or four subsequent movements, to administer an anaesthetie; these movements should be made quite free when an anaesthetie is used, the surgeon being careful not to earry them to the point of exeiting new inflammation. After some days the passive movements can be made daily, accompanied with friction, and shampooing should be very liberally done. These movements may be increased in frequeney as the case advances, until finally an instrument can be so adjusted to the limb that the patient can cause the movements many times in the day without the attendance of his physician. So soon as the parts can be pressed together by bearing the weight of the body upon the foot without tenderness, the extension can be omitted, and the movements daily increased. By pursuing this plan, and by the application of the same principle to the wrists, elbows, and other joints, I have never had a ease of constitutional fever or suppuration follow the *brisement forcé* of any joints.

In eases of *complete* or *bony ankylosis*, seetion by the saw is absolutely neecessary. Barton, of Philadelphia, first made seetion of the upper portion of the femur for *angular contraction* with *bony ankylosis* in 1826, with a very perfect result. Dr. Gurdon Buck, of this city, performed the same operation in the New York Hospital in 1841 or 1842, by taking out a V-shaped portion of the knee for *angular ankylosis* at that joint. I modified Barton's operation for anehylosis of the hip-joint in 1862, by making a eurved section of the femur above the trochanter minor and a straight seetion a few lines below the first curved cut, thus removing a bloek of bone.

This operation I made in two cases, and both resulted in perfect success. The first case is still living. The other case died of another disease some months after the operation, but lived long enough for Nature to make an entirely new joint with capsular ligament, synovial membrane, and a double ligamentum teres, which is here seen in the specimen before you. These cases have all been published, and therefore there is no necessity of making any further mention of them.

Mr. Adams, of London, has very much simplified this operation by making a simple subcutaneous single section through the neck of the femur in these angular deformities of the hip, with very satisfactory results. Dr. Sands, of this city, has repeated Dr. Adams's operation, with the result of a movable joint. Reasoning *a priori*, I would suppose that the single section through the bone, although you might by it remove the deformity, you would be in danger of effecting a cure by ankylosis. The case of Dr. Sands, and some of those reported by Dr. Adams, seem to disprove this position, but sufficient time has hardly elapsed to judge whether they may not after a while become ankylosed, although in an improved position.

*CASE I.—Ankylosis of Knee; Brisement Forcé; Result perfect, Ward 8, Bellevue Hospital; from Hospital Records.*

“R. D. Steele, June 29, 1869, aged twenty-two, Kentucky. On the 11th of December last, patient accidentally shot himself with a Colt’s revolver, the ball entering the right thigh, on its anterior aspect, midway between the groin and the knee.

It lodged in the tissues, on the outer side of the patella. The next day the ball was removed. Patient says that his knee then began to inflame, getting swollen, red, and painful.

There was much discharge through the opening made by removing the ball, and patient was confined to his bed for two months.

During this time his knee became ankylosed, almost in a straight line.

On admission to hospital, the right thigh and leg were smaller than left, the following measurements being taken: Right thigh,  $15\frac{3}{8}$  inches in circumference; left thigh,  $17\frac{1}{8}$  inches in circumference; right leg and calf,  $10\frac{1}{2}$  inches in circumference; left leg and calf,  $12\frac{1}{4}$  inches in circumference.

There is barely any motion of the joint. The patella is slightly movable.

Patient's general condition good. He gives no history of hereditary disease; the limb gives him no pain.

*June 30th.*—To-day patient was etherized, and Dr. Sayre broke up the adhesions with little trouble, so that the leg could be completely extended and flexed, at an acute angle, upon the thigh. The toes were strapped, the foot and leg bandaged, a large sponge strapped into the popliteal space, and another placed over the femoral artery, so as to compress it moderately. A long splint of leather was then adapted to the back of the thigh and leg, and bandaged firmly. 7 p. m. patient doing well; has some pain; ordered liq. morphiaæ sulph. (U. S. P. 3 iij).

*July 1st.*—Slept well last night, and has no pain in knee. 7 p. m., foot rebanded.

*6th.*—Since last note patient has been doing well. To-day Dr. Sayre took off the splint and bandage, and made passive motion, which was very painful. Patient was then anæsthetized, free passive motion made, and dressing reapplied.

*7th.*—Joint was moved again.

*9th.*—Splint removed to-day. Patient out of bed.

*14th.*—Joint moved to-day under chloroform. From this time the motions were made more frequently, and an instrument adjusted, so that the patient could flex and extend the limb at his pleasure. He was advised to do this frequently every day. The result was, that he recovered with perfect motion in less than three months.

I saw Mr. Steele in January last, and his limb is as perfect as the other."

CASE II.—*Necrosis of Lower End of Femur, complicated with Fibrous Ankylosis of Knee-Joint; Brisement Forcé; Recovery with Motion.*

George W. Orr, of Bloomingdale, aged twenty-four years; fell, when he was ten years old, from a height of ten feet, striking upon his right limb, followed by a periostitis of the lower end of the femur, ending in necrosis of femur and ankylosis of knee-joint. When he was fifteen years of age (after a lapse of five years), one of the sinuses of the outer portion of the thigh was dilated, and a piece of bone two and a half inches in length and about two-thirds of the circumference of the femur was removed. His leg at that time was flexed at an acute angle with the knee.

The wounds of the thigh healed after a few months, when, under the influence of chloroform, by *brisement forcé*, his limb was made perfectly straight, dressed in my usual way with a partial compress over the femoral artery, retaining splint, binding the knee, extension by weight and pulley, ice-bags to the knee-joint. No constitutional or other irritation followed the operation. At the end of seven days the dressings were removed. Considerable ecchymosis appeared round the neighborhood of the knee from the rupture of blood-vessels at the time of the operation, but no excessive heat or other evidence of inflammatory action. The limb was very slightly moved and again redressed as before, with the exception of the sponge compress upon the femoral artery. In two days it was again redressed and more free movements given it.

From this time on, the dressings and motions were made daily for about a fortnight, when the passive movements were advised to be made several times within the twenty-four hours. These movements were constantly increased, until, at the end of three months, the cure was perfect and complete, with the entire mobility of the joint, complete extension and perfect flexion, as is now seen in the case before you.

CASE III.—*Fibrous Ankylosis—Knee.*

Joseph S., aged seven years, was brought to me October 30, 1873. The following scanty history of the case was all that could be elicited :

When two years old he had rheumatism. The joint chiefly affected was the left knee. The father says, "His physician called it '*bony ankylosis*' and '*white swelling*.'" It was treated with iodine externally—no extension. The limb was always crooked, but he could walk upon it until the summer of 1872, since which time the present distortion has existed. There is fibrous ankylosis of the knee. The tibia is luxated backward. There is very slight motion of the joint; the patella is probably movable.

*Treatment.*—*December 6, 1873.* At the college clinic I divided the hamstring tendons of the left limb subcutaneously without loss of blood. The patella was then forcibly separated from the end of the femur and the limb drawn down to the position of complete extension, and retained by a weight-and-pulley dressing. The limb was dressed in my usual manner, viz.: The instep and ankle were well padded with cotton, the roller neatly applied over this and up the leg. The popliteal space is protected by a large soft sponge. The inequalities of the knee carefully padded, strips of strong adhesive plaster are snugly drawn over the sponge and pad, and the whole covered by carrying the roller up over the knee and lower part of the thigh. A small piece of sponge is then placed over the course of the femoral artery, above the junction of the middle and upper third of the thigh, and the roller carried farther up and completed by a spica. The boy was taken directly to lodgings, put to bed, and a dose of morphia given him.

*11th.*—Dressing removed and reapplied. Most excellent condition in every way.

*20th.*—Came to clinic with extension-brace, which was applied yesterday. Motion good; passive motion ordered. Returned to his home in Yorkville.

*January 12, 1874.*—Has for a week past complained of pain, particularly for the past three days. Compression in axis of limb gives pain. Extension gives relief. Knee-extension instrument ordered.

*April 1st.*—Boy walked into my office without crutches.

Instrument readjusted. Suffers none from knee, but has symptoms of "chills and fever." Lives near the "Vanderbilt improvement," Ninetieth Street. Ordered quinine and iron.

*June 1st.*—General condition good; still tender over lower insertions of lateral ligaments. Instrument readjusted.

*23d.*—Boy doing well. Instrument not removed, but bandage reapplied.

*August 1st.*—Instrument removed; walks well, with good motion, about one-third normal freedom.

**CASE IV.—*Fibrous Ankylosis—Knee; sub-luxated; Brisement; Recovery.***

William M., aged nine years, from Auburn, N. Y., came to me November 5, 1868, and gave the following history: About June, 1864, the father noticed that the lad began to drag his left foot. He complained of no pain, and appeared to have nearly perfect power over the limb. Five or six months later the knee began to swell, and appeared to be "*filled with water.*" This condition continued for about two years. Gradually the swelling disappeared. He was treated at intervals during the continuance of the trouble, by various physicians. About two years since the child was ordered to go upon crutches, no attention being paid to the contraction. The limb was then nearly straight, but since that time the contraction has gradually increased. For the last eighteen months the limb has been nearly as "tough and sound" as the healthy one, saving the contraction.

The position of the limb is as follows: The leg is sub-luxated backward and outward slightly. There is slight motion at this new joint. The patella is apparently adherent by bone.

*6th.*—Drs. Hamilton and Krackowizer saw the patient with me. While examining the patella, Dr. Hamilton thought he detected motion. This was rendered certain by the following manœuvre: Dr. Hamilton placed his finger upon the groove between the patella and external condyle, so that the sharp edges of the two bones could be at the same time felt. I then made firm pressure upon the inner edge of the patella, and the two edges of bone before mentioned were felt to ap-

proximate, the patella slightly overriding the condyle. The opinion of the consultation was, that an attempt should be made to restore the normal position of the limb; that, under anaesthesia, as much as possible should be done, and the limb retained in the position gained, by a splint, or by extension, according as might be best in practice.

*9th.*—The boy was chloroformed, and the limb forcibly straightened as far as possible. While the limb was firmly held in proper position, a weight-and-pulley extension was applied. The vessels were protected by a sponge in the popliteal space. The supply of blood to the joint was diminished by the pressure of a small sponge placed over the femoral artery and confined by the bandages.

*27th.*—Made a second operation. At this sitting the limb was brought nearly straight, the hamstrings were probably broken. The limb was fixed by a posterior leather splint. No reaction of importance followed.

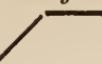
*December 19th.*—The limb is nearly in perfect line. Passive movements have been employed for two or three weeks.

Put on an instrument for angular motion of the knee. The boy left for home; treatment to be continued under direction of his family physician.

*February, 1869.*—The father writes: “The knee had improved very much, when the boy was seized with typhoid fever and died.”

#### CASE V.—*Fibrous Ankylosis of Left Knee.*

Catharine B. was admitted to Bellevue Hospital June 3, 1868, when she gave the following history (copied from hospital register): She was confined April 1, 1868, and remained in bed but two days after. On the 13th of April she first noticed pain in the left leg and knee. Very soon the parts became much swollen, red, and very tender; at the same time she had chills, fever, and sweat. She was compelled to keep the bed for four weeks. Since her admission to the hospital, the knee has been blistered, compressed with sponges, and extended. All these plans seemed to be of some benefit. Passive motion, showering with alternate hot and cold water,

have been employed with little effect upon the ankylosis. For several months the joint has been ankylosed, the angle being about thus  —135°. There is at present but little pain in the knee, though she says "it is worse in damp weather."

At clinic, January 6, 1869, I made the following comment on the case, previous to operating: The hectic sweats, etc., lead to the belief that this was a case of pyarthrosis, but the liquid has since been nearly all absorbed, and it was probably all synovia. The ankylosis is at too great an angle, and I shall therefore try by *brisement* to place it in a better position. The patella seems to be movable. There is some danger of reëxcitation of inflammation by the *brisement*, since hitherto all attempts at establishing motion have been attended with considerable reaction. There is one point, below and outside of the patella, which is still tender. "I do not hope in this case to get motion." I applied the preparatory dressings as usual. The patella was started off by bending the limb backward, and then straightening it. Free motion was given to the joint. The knee had become slightly inverted; this was straightened by pressure. The usual dressings of sponges and plaster and roller, with a posterior splint, were applied. Directed absolute rest for ten or twelve days.

13th.—No reaction took place. Every thing proceeding perfectly well. Patient has had no pain after the first thirty-six hours succeeding the operation.

20th.—Extension no longer giving relief, was removed as unnecessary.

*February 13th.*—Has continued to do well.

*May 1st.*—Has continued to improve; is walking with the aid of a stick.

14th.—Having left the hospital on a pass, and overstaid her time, she was discharged to-day.

#### CASE VI.—*Ankylosis—Hip.*

Miss —, of Hudson, N. Y., was brought to me by Dr. J. F. Phillips, of Claverack, N. Y., November 27, 1867, giving the following history:

When three years old she caught her foot in a hole and fell. She was able to walk home, but complained of severe pain, and was confined to the bed for two years from that time. During this time the right lower limb became strongly flexed on the pelvis and adducted across the upper portion of the opposite thigh. Previous to the injury she had been perfectly healthy.

Since she was five years old she has been able to go round on crutches, and for the last six or seven years has been able to *flex* the thigh upon the pelvis and extend it slightly, but cannot *abduct* it at all.

General health perfect, and tolerably robust. Right limb five inches shorter than the other; that is, the foot cannot be brought within five inches of the floor (when the sound limb is straight), and it is very strongly adducted.

A line drawn from the right tuberosity of the ischium around the hip, to the anterior superior spinous process of the ilium of the same side, passed nearly *three inches below* the top of the trochanter major, which could be distinctly felt on flexion and extension of the thigh upon the pelvis, showing that a *new joint* had been made upon the dorsum of the ilium, but on account of the adduction of the limb she could bear no weight upon it without falling upon the right side.

I put her under chloroform, and, by moderate force with my hands, very slowly and gradually abducted the limb, Dr. Phillips holding the pelvis quiet, when suddenly the tendon of the adductor longus snapped off with quite a loud noise. After a few minutes I was able to *abduct* the thigh to nearly a right angle with the body, the pelvis being held still and the other limb being straight, showing that the motion was in the new hip-joint and not in the lumbar region. The recovery from chloroform was slow, but at the end of two hours she could rise and walk with the limb straight under her. She could *voluntarily* abduct the limb six inches from the central line of the body. It was now only two inches shorter than its fellow, and could nearly support the weight of the body.

The patient returned to Hudson on the same day in a

sleeping-car, without experiencing any trouble, having been carefully bandaged on a well-padded board, and on reaching home was put to bed and fomented.

*December 1st.*—I saw her; found her perfectly comfortable, and she had suffered no pain since the operation. There was a slight discoloration upon the inside of the thigh. She is able to *flex*, *extend*, and *abduct* the limb and to bear her entire weight upon it without pain if she has gentle support to prevent her falling, the muscles not being strong enough to sustain or steady her body.

I directed that the limb should be rubbed, shampooed, and that Faradism should be applied to it.

*12th.*—Dr. Phillips reports, “Case still improving.”

*September, 1868.*—Miss —— called upon me. The limbs are parallel. The limb formerly ankylosed can now be moved voluntarily in every direction, and over quite a large arc. The knee of the diseased side is considerably above that of the sound side. The right limb, measuring from the top of the trochanter major to the external *malleolus*, is one inch shorter than the left. This shortening is increased by the position of the head of the femur, so that, measuring from the anterior superior spinous process to the internal malleolus, the shortening is two and a half inches. The discrepancy is made up by a thick cork-sole, and she walks well with the assistance of a cane.

*CASE VII.—Fibrous Ankylosis of Hip; Tenotomy; Brisement; Recovery, with Motion.*

G. W. S., aged fourteen years, consulted me for the first time, September 17, 1872, and gave the history of his case as follows :

Nearly ten years before, he was attacked with hip-disease on the left side, as the result of a fall. The trouble continued for five years, during which time the disease progressed to the third stage, abscesses formed, were opened and discharged, small pieces of bone coming away from time to time. No large pieces have ever been discharged.

About five years from the beginning of his trouble, while

running, he caught and twisted his foot in a rope. For several weeks afterward he was unable to move without the greatest suffering. He subsequently improved, and became quite sound and strong.

Health good. Wears, in walking, *four and a half inches lift* upon the left shoe. He is not easily fatigued in walking, and does not complain of pain. When his trunk and the sound limb are in normal position, the affected limb is flexed and *abducted*, the left foot falling upon the outside of the right knee. It is brought down to a position permitting walking by strong tilting of the pelvis. It is possible that the second accident, above mentioned, may have increased the motions of the joint.

*28th.*—Under chloroform, I divided subcutaneously the tendons of the adductors (*pectineus, adductor-longus gracilis*) and the *tensor vagina femoris*; dressed the usual way, and placed in the wire-breeches.

*October 12th.*—No inconvenience has been experienced by the patient. He was removed to-day from the wire-breeches.

*19th.*—Was allowed to ride out.

*December 6th.*—Has had a two-inch lower-heeled shoe constructed; called to-day to show it. Walks very well with it; the limbs are parallel, and he is able to flex the thigh upon the pelvis to a right angle.







